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Medical Informatics and Telemedicine: A Vision

Terry P. Clemmer, M.D.
Professor of Medicine
University of Utah School of Medicine
Director, Critical Care Medicine, LDS Hospital
Salt Lake City, Utah

I. INTRODUCTION

- A. On April 12, 1961, Yuri A. Gagarin rode the spacecraft Vostok 1 for man's first trip into space. This trip was a testimony of man's commitment to a vision. Today I would like to convey to you another vision; a vision of what we are about to embark upon in medicine. I hope we can generate a commitment toward this vision as we have towards so many others.
- B. The vision is how medical information systems are going to impact the way we deliver medical care in the future.

II. The goal of Medical Informatics is to improve care. This requires the commitment and harmonious collaboration between the computer scientists and clinicians and an integrated database.

III. The integrated database receives input from all departments and, where feasible, is automated from bedside and laboratory devices.

- A. Examples: Infusion pumps, Ventilators, the medical information bus.

IV. Medical Information Systems today are used primarily to:

- A. Retrieve, process, organize and display data for the healthcare provider.
- B. Alert the healthcare provider of dangerous situations.
- C. Provide a database for research efforts.

V. The real power of medical informatics is much greater.

- A. It is a tool which can foster the standardization of care. With standardization comes enormous power to improve care while reducing costs.
 - 1. The process of computerizing a standard in itself improves care.

- a. The initial logic for decision making is developed by experts who are required to publish for review and defend their decisions to their peers.
 - b. Once developed, the initial logic decisions are implemented by feeding the decisions to the healthcare providers in a clinical setting for validation prior to carrying them out. Any overrides of the protocol are logged and reviewed in regularly scheduled iterative sessions. When overrides are deemed justified they become the stimulus to modify and strengthen the protocols. Thus the standard is constantly improving. If the override cannot be justified then the healthcare provider is informed that they are practicing outside the computerized standard.
 - c. Example: The ECCO₂R Study.¹
2. Standardized care is a powerful tool for evaluating and directing new therapies.
 - a. Once a standard is set, the evaluation of any new drug, device or process of care is greatly facilitated and more credible.
 - b. Outcome evaluation and cost-effectiveness becomes more scientific and reproducible.
 - c. The role of the new therapy can be better defined.
 - (1) Example: The role of ECCO₂R
3. Standardization provides a platform for new and exciting methods of automated, real time quality assurance (QA).
 - a. Because there is a standard, breeches can be monitored and alerted via the computer. These breeches can be reviewed expeditiously, and where indicated, immediate feedback given to the care provider. Thus prospective quality assurance can be carried out for every patient.
 - b. Example: LDS Hospital's Respiratory Therapy programs.²
- B. Standards assist and facilitate healthcare providers in decision making.
 1. It allows the healthcare provider to immediately know the standard.
 2. On-line epidemiology allows many of the computer decisions to be based on real time scientific data.
 3. It can prospectively feed back costs of various decisions to the care provider at the time of ordering.
 4. It can remind and prompt timely care decisions.

5. Examples:
 - a. Antibiotic assistant program.³
 - b. Prophylactic antibiotic study.⁴
 - c. The adverse drug reaction study.⁵
- VI. Today, using integrated databases, computer scientists and clinicians are beginning to step through this window of opportunity. They are just now launching the attack on the inconsistencies in the process of care via the application of medical informatics.
- VII. This is just the tip of the iceberg. What is being done today is to this vision what the Mercury spacecraft was to the space program. We are in the infancy of our journey.
- VIII. Medical Informatics' link to telemedicine will vastly expand the vision for improved healthcare universally.
 - A. One of the most difficult problems is how to improve care in areas which have sparse resources and sporadic physician coverage; such as in rural areas, disaster and battle scenarios, and in remote areas such as the Antarctic, ships at sea, and space missions.
 - B. There are three major problems in delivering healthcare in these areas:
 1. Lack of readily available local expertise and technology.
 2. Poor communications with experts in a timely fashion.
 3. Lack of ability to monitor, collect data and provide quality assurance in these areas.
 - C. By linking medical informatics systems to rural and remote areas through telemedical links the same standards of decision making can be applied everywhere. In addition, the epidemiologic data could be retrieved and continuously updated in real time for improved decision logic, quality assurance, and public health purposes.
 - D. Example: IHC Transurethral Prostatic Resection Study.⁶
 - E. Such technology will also allow us to share the process of care between nations and to include third world countries.
- IX. This is a glimpse of what is about to happen. The potential impact of improving the process of care is equal to, and probably more important than, the marvelous advancements we are seeing in the basic sciences.

- X. High quality care is less costly care. Given our current economic crisis in medical care we must focus on quality. We must evaluate and validate new technology and its relationship to the process of care and its cost-effectiveness. Standardization also allows the expense of care to be evaluated and as cost reduction methods are implemented, to evaluate any change in outcome and therefore assess cost and benefit. Medical informatics gives us a powerful tool to address these issues.
- XI. Standardized care may allow protection against legal action where undesirable outcomes occur despite practicing within the standard. The potential impact of this on healthcare costs could be dramatic.
- XII. The **BARRIERS** to realizing this **VISION** are great.
- A. First, one of our major restraints is that current funding for this vision is very difficult to find. Outcomes research funding today is not a leading priority of any agency.
 - B. Secondly, we need visionary men and women, champions, people with determination akin to President John Kennedy's commitment to the space program.
 - C. Thirdly, we need ethical, caring healthcare providers who are willing to admit they frequently do not know what the best therapy is, and who are agreeable to abandoning their stylistic differences and committing to discovering truth, and discovering better ways to care for patients at reduced costs.
 - D. Lastly, we need a balance in research between the basic sciences and clinical applications. We need to learn how to more effectively apply the current and future knowledge to benefit mankind worldwide.

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